

Chapter 19

Electronic Charts of Inland and Coastal Navigation Systems

19-1. Purpose

A USACE Master Plan is currently under development for production and dissemination of electronic chart data that will primarily benefit navigation on US waterways. Such data will follow the international S-57 hydrographic data exchange standard, and will be implemented in two parts: inland waterways and coastal/Great Lakes areas. Production and dissemination of such data products will benefit safety of navigation, aid in industry training of vessel operators, enable more efficient use of waterways and navigation infrastructure, foster better coordination among USACE, NOAA and USCG, and reduce time spent by districts assisting users of USACE charts. Development of the Master Plan and implementation Corps-wide is expected to occur over five to six years, and will begin with pilot projects to convert existing hydrographic data into S-57 format. Currently, districts can begin structuring and disseminating data to navigation users in ways that will ease conversion to formats and structures being defined in the Master Plan. Therefore, this chapter provides interim accuracy requirements, data content standards, technical compilation criteria, and Internet distribution procedures for digital data, maps, and hard-copy charts of inland navigation projects, such as the sample chart depicted in Figure 19-1. It also provides guidance for the development of digital and hard copy navigation products of coastal navigation projects-- i.e., Project Condition Surveys and Reports. The guidance outlined in this chapter is intended to provide Corps-wide uniformity for both electronic and hard copy map/chart products furnished to NOAA, commercial waterway users, and the general public; and begin data organization for eventual implementation of the Master Plan for electronic chart data.. These technical standards will help ensure that USACE navigation project data is consistent with, and fully supports USCG Vessel Traffic Systems (VTS), and Automatic Identification Systems (AIS). These standards also ensure digital navigation products will be consistent with the positional accuracy standards currently achieved by the USCG-USACE maritime Differential Global Positioning Systems (DGPS). This guidance additionally supports the maritime navigation safety recommendations issued by the National Transportation Safety Board in 1994. This guidance supplements applicable portions of ER 1130-520, Navigation and Dredging Operations and Maintenance Policies, and EP 1130-2-520. See references in Appendix A.

19-2. Scope

This chapter covers electronic charting of inland navigation and coastal deep/shallow draft projects. It covers source products, such as hydrographic surveys, maps, charts, condition reports, drawings, tracings, etc. This data includes, but is not limited to, planimetric, topographic, hydrographic, tabular, and related geospatial data contained in Geographic Information Systems (GIS) or other computer-based systems that are used to collect, process, or store data on projects covering the inland waterways, Great Lakes and coastal areas.

19-3. Background

Executive Order (EO) 12906, *Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure (NSDI)*, prescribes Federal policy and establishes mechanisms for acquiring, processing, storing, distributing, and improving utilization of geospatial data, including making this data readily and freely available to the public via Internet and other media resources. ER 1110-1-8156 provides implementing guidance for the EO, as outlined in Chapter 6. This EO states that Federal agencies shall develop a plan to make geospatial data holdings available to the public and identify additional technologies and policies needed regarding releasing data to the public.

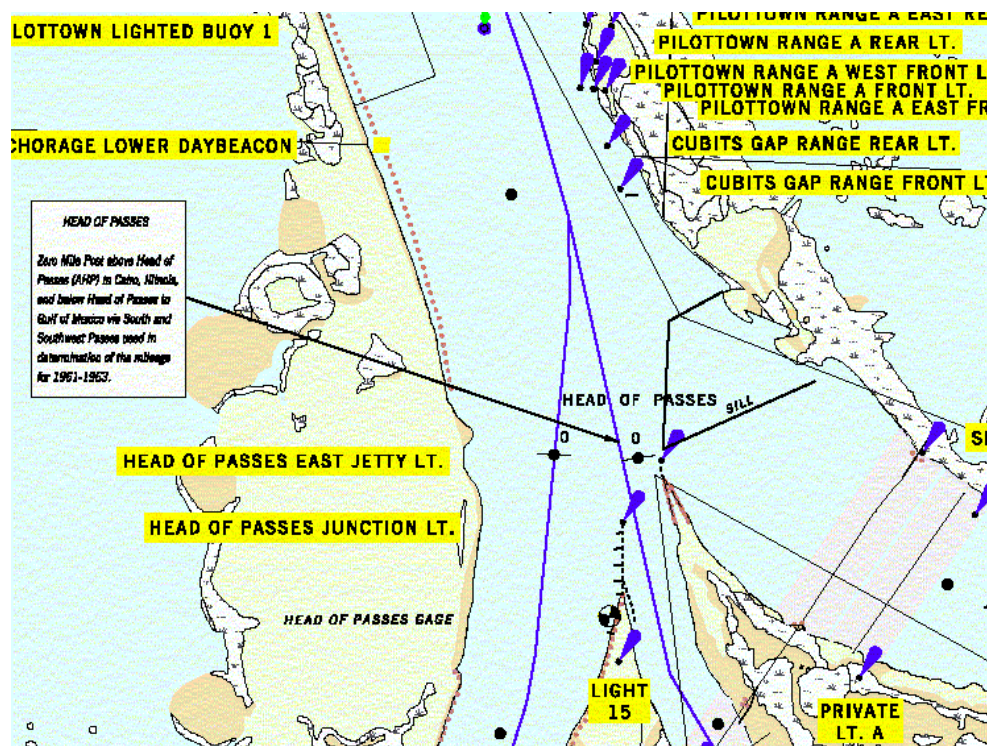


Figure 19-1. Portion of river chart book published by New Orleans District--45-ft maintained project at Head of Passes, Mississippi River

a. Current guidance. Chapter 2 of both ER 1130-2-520 and EP 1130-2-520 provides current policy and technical guidance on the publication of hard-copy charts and project condition reports of USACE navigation projects and related civil works water resource activities. These guidance documents were intended to cover traditional commercial and recreational navigation requirements--i.e., distribution of tabular project condition data or relatively small-scale (1 in. = 2,000 ft) hard copy maps and charts of river and harbor projects. These technical guidance documents do not address electronic chart systems (ECS) or Internet data access processes.

b. Data and ECS standards. The USACE Master Plan for electronic chart data will follow the International Hydrographic Office S-57, Edition 3.1, "IHO Transfer Standard for Digital Hydrographic Data" for all electronic chart and related products disseminated outside the Corps. This standard is recognized internationally by ECS vendors and users, as well as most government hydrographic offices, as the accepted format for ECS data. Although details of data conversion to the S-57 standard have not yet been determined, guidelines for current data organization are presented in this chapter.

c. Maritime differential GPS impacts. Since the mid-1990s, significant technical developments have occurred which require reanalysis of the type and accuracy of navigation information furnished to the waterway industry. These major developments include the highly accurate (i.e., meter-level) maritime Differential Global Positioning System (DGPS) network, and vessel traffic systems (VTS). As a result of these developments (still on-going), many inland and coastal navigation hard-copy chart products are neither sufficiently accurate nor contain vectorized data structures and attribution to support real-time

electronic navigation systems. The critical need for coordinated electronic navigation standardization was contained in National Transportation Safety Board Recommendation M-94-30. The NTSB specifically recommended that the USACE and USCG coordinate efforts to expand maritime DGPS coverage in the inland waterways and supplement this coverage with electronic chart coverage in those waterways.

d. Coastal deep-draft and shallow-draft projects. Coastal and Great Lakes navigation projects are surveyed at varying intervals, ranging from daily to annually. Each USACE command prepares and distributes these coastal project/channel condition surveys in different formats, symbologies, and media—typically in large-scale (e.g., 1 in = 100 ft to 400 ft) engineering drawing format. These data are provided to NOAA in varying forms for incorporation on NOAA charts covering these navigation projects. NOAA charts covering navigation projects are usually at much smaller scales—typically in the 1 in. = 500 ft to 3,000 ft range. As a result of these scale disparities, USACE survey data is rarely included on NOAA charts, but is tabularly summarized as channel clearances. In order to support real-time DGPS navigation requirements, NOAA is currently developing large-scale electronic chart bases for major CONUS ports. These new electronic chart bases will be closer in scale to USACE project condition survey drawings and will allow detailed USACE channel parameters and depth data to be directly viewed by outside users. By adopting the S-57 standard, surveys and channel information will easily be interpreted and exploited by NOAA. Chart supplements might also be possible, where USACE districts produce S-57 electronic navigation charts (ENCs) within the channel, which navigation users can then overlay on the NOAA ENC. Although an implementation plan for the S-57 standard has not yet been developed, USACE districts should begin standardizing existing formats and symbologies, and provide the data files to NOAA.. This chapter provides standardization guidance for large-scale coastal project condition surveys

e. Inland navigation projects. On the inland waterway systems, USACE-published chart books are produced and distributed to the public in a variety of formats, symbology, scales, and electronic media; in accordance with the recommended guidance currently provided in EP 1130-2-520 for these hard copy products. Currently, these product formats vary significantly between districts and/or waterways. In order to support electronic charting and navigation requirements, and to provide a seamless connection between coastal, Great Lakes, and the various USACE inland navigation projects, standards for preparation, update, and electronic distribution of these products are essential. This standardization requires complete coordination between all the agencies involved, i.e., USACE, NOAA, and USCG; as is currently being pursued by HQUSACE.

19-4. USACE Current and Planned Electronic Charting Policy

It is USACE policy that all electronic or hard copy navigation products should have consistent and standardized feature accuracies, scales, data definition content and attributes, symbologies, digital file formats, and Internet viewing and downloading mechanisms. Electronic chart products should also have a uniform maintenance and update plan. This policy is being implemented in close coordination and cooperation with NOAA and the USCG to ensure seamless, standardized navigation products are provided nationwide. Pilot projects and products are being initiated to begin coordination among federal agencies and the navigation industry. Currently, USACE activities should take the following steps to make navigation data available to outside users in usable formats.

a. Digital surveying and mapping data of both coastal harbor and inland navigation projects should be furnished to users in formats that are exploitable for electronic chart databases.

b. Small-scale hard-copy inland charts and river books should be disseminated over the Internet in either digital (vector) or raster format. In addition, large-scale electronic versions of inland navigation projects should be made available for use in commercial navigation. Smaller scale hard copy navigation

charts covering inland waterway systems should be produced directly from the detailed large-scale digital databases used in preparing charts.

c. Digital data generated on USACE navigation projects should use FGDC- Corps- and NOAA-prescribed chart feature standards, formats, file standards, and symbologies--see Chapters 3 and 6 for references to standard criteria. The Master Plan will establish standard features and methods of conversion from the existing features.

d. Planimetric, topographic, hydrographic, and other related geospatial project data developed by USACE, should be made freely available to public and private users through the Internet. The Master Plan will establish a standard server structure and a central interface to databases distributed among districts. Until this structure is established, districts should post data on their own web sites.

e. Planimetric navigation features shown on project drawings and charts should have positional feature accuracy (i.e., base map scales) compatible with the accuracy now being obtained by maritime DGPS technology—i.e. 1 to 3 meters RMS (95%).

f. CADD/GIS data layers/levels depicted on electronic/vectorized charts should include the following features, where possible. Refer also to more detailed CADD/GIS layer/level assignments listed in Table 19-2 at the end of this chapter.

Bridge piers	NAVAIDS
Shoreline/coastline	River mile
Safety contour (project depth)	Pipelines
Zero contour	Overhead cables
Locks	Anchorage areas
Dredge areas	Sailing line
Navigation hazards	Flow Regulation Structures
Channel centerline	

g. Navigation data should be collected, processed, and distributed in standardized vectorized formats with individual feature CADD or GIS layers/levels that separate feature categories as much as possible. Text and annotation should also be separated by layers/features.

19-5. Navigation Product Standards and Specifications

The following standards should be followed in disseminating charting and related navigation data to the marine industry and the general public as a step toward the Master Plan. These product standards are intended to provide Corps-wide consistency for all navigation data products, both in hard copy and electronic format. They apply to basic digital navigation data collected by the USACE and to electronic and hard copy navigation chart products. They also represent significant technical revisions to portions of Chapter 2 of EP 1130-2-520. Base maps, channel condition survey drawings, and/or charts of river and coastal harbor navigation projects should meet the following standards.

a. *Base mapping accuracy standards for navigation projects.* A significant surveying and mapping effort may be required to increase base mapping accuracy on many USACE inland and coastal navigation projects. This mapping (or remapping) must be performed at an accuracy consistent with maritime DGPS accuracy, in order to ensure mutual consistency with positioned features on NOAA or USACE electronic charts. Prior mapping performed for small-scale river charts will not meet these requirements. Most of this work will have to be performed using photogrammetric mapping techniques.

In some cases, recent large-scale mapping for hydraulic modeling studies, flood inundation studies, and other engineering purposes, may be recompiled for navigation purposes.

(1) Minimum accuracy standards for horizontal features. Planimetric navigation features should be positioned to an accuracy not to exceed 10 feet (3 meters) RMS at 95% confidence level. This 10 foot (3 m) feature accuracy tolerance falls within the average accuracy of typical DGPS receivers using the USCG/USACE maritime DGPS radio beacon network along coastal and inland waterways, i.e., 1 to 5 meters RMS (95%), depending on distance to beacon, receiver quality, Horizontal Dilution of Position variances, etc. Given future vessel traffic control system positional accuracy requirements, base maps of USACE projects need to meet or exceed these accuracies—especially in restricted areas--lock approaches, docking, etc. For coastal and inland waterway systems, a minimum base map compilation scale of 1 in = 400 ft (1 : 4,800) is specified for topographic/planimetric features critical to maritime DGPS referenced navigation. Scales larger than this standard (e.g., 1 in = 50 ft to 200 ft) may be used in/around critical navigation features--e.g., locks, dams, bridges; however, basic map scales should not be less (smaller) than 1 in = 400 ft value without specific HQUSACE approval. The 10 ft (3 m) RMS feature accuracy should be obtainable from a photogrammetrically-compiled map in accordance with ASPRS Class I Large Scale Mapping Standards, as defined in EM 1110-1-1000, Photogrammetric Mapping--see also Figure 19-2. Critical navigation features may need to be located to a higher accuracy than 10 ft RMS by using conventional survey methods. These features might include fixed navigation aids, lock chambers and lock approach walls, bridge piers/fenders, etc. Static positions with maritime DGPS will provide sufficient accuracy for these critical features. Existing as-built drawings may also be used if geographically referenced. A centralized, coordinated resurvey and collection of features across district and division boundaries is being planned. However, districts should survey and compile information for features listed in, but not restricted to, paragraph 19-4-f, where resources and current project plans permit, according to the following guidance.

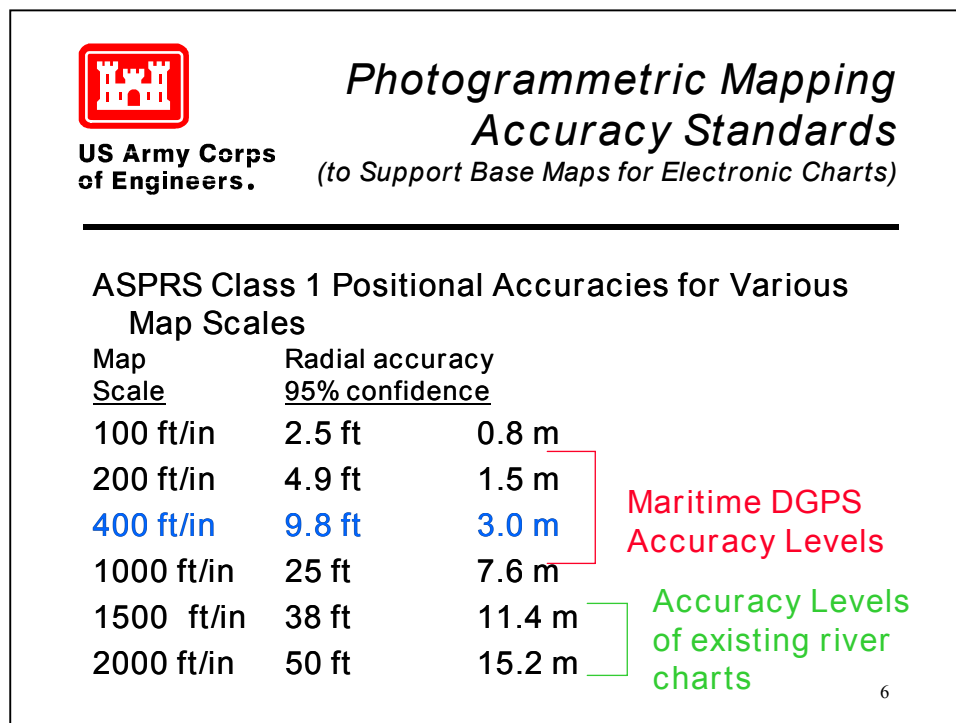


Figure 19-2. Photogrammetric mapping accuracy standards relative to navigation chart planimetric feature accuracies

(2) Line mapping feature requirements. Base maps should consist of standard planimetric line drawings depicting critical navigation features within and adjacent to the navigation channel. Features should be separated by attribute/layer/level assignments. Care should be taken to ensure a linestring depicting a feature is continuous or linked, rather than a series of disconnected graphic elements. Area features should also be depicted with closed polygons or shapes. Digital imagery (e.g., orthophotos) is not needed for electronic navigation purposes. Except for significant landmark items, features should generally be confined to the waterway and area between top banks of the levees. Overbank topography needed to define bankline limits on rivers with significant stage variations should also be included. If these base map products will be used for other planning, engineering or construction purposes, then topographic, DEM/DTM, and/or digital orthophoto images may be included as separate layers/levels with the base planimetry.

(3) Accuracy standards for measured depths shown on navigation products. Follow performance standards outlined in Chapter 3 and Table 3-1. Depth accuracy standards vary with (1) type of measurement equipment, (2) nominal water depth, and (3) hardness (hazard) of bottom.

(4) Requirements for depth data on inland navigation chart products. Depth data obtained from periodic channel condition surveys is valuable information for electronic data bases developed for digital charts and will be included in the Master Plan. For current practice, full inland river coverage is not necessarily required when routine surveys are performed only at critical bends or approaches. Hydrographic survey data may be obtained from any available source, e.g., hydraulic model stream sections (HEC models), inundation surveys, etc. Densely acquired hydrographic depth data--e.g., that collected from LIDAR or acoustic multibeam systems--should be thinned to a bin size (or post spacing) consistent with the largest display scale use of the data. For most deep-draft coastal projects, this would equate to viewing at approximately 1 in = 100 ft, or 1:1,200. The recommended procedures and software used for such data thinning/binning is covered under the chapter on multibeam survey systems in this manual. It is critical that data thinning routines do not adversely corrupt or erroneously warp the reduced model.

b. Horizontal chart datum standards. All engineering drawings of USACE coastal and river navigation projects should be horizontally referenced to the GPS reference ellipsoid/system--WGS 84. The reference datum should be North American Datum (NAD) 83. Navigation projects still referenced to NAD 27 should be transformed to NAD 83.

c. Coordinate reference system for electronic base maps and coastal project condition surveys. All CADD/GIS databases (and CADD file reference origins) should be referenced to the North American Datum of 1983 (NAD 83). Currently, coordinates should be based on the local State Plane Coordinate System (SPCS) for the area. When implemented, the Master Plan will require geographical coordinates (latitude-longitude), and conversion procedures will be defined.

d. Coordinate reference system for hard copy river books (small scale). Use geographical coordinates (latitude-longitude) based on NAD 83 as a coordinate reference for all published river books. SPCS coordinates may optionally be added.

e. Local reference systems. Chainage-Offset coordinates and River Mile systems should be included on all products where applicable.

f. Vertical reference datum standards. The intent of the Master Plan is to use vertical datums common to USACE, although S-57 convention may require other systems. Currently, the following datums should be used, and conversions will be defined if other systems are required.

(1) Coastal—MLLW throughout CONUS tidal waters.

(2) Great Lakes--IGLD 85.

(3) Inland navigation and river systems--varies per local low water datum/pool reference (e.g. LWRP 74).

(4) Reservoir systems (controlled/regulated). Typically absolute elevations relative to NGVD 29 or NAVD 88 are used on controlled reservoirs. If depths rather than elevations are used, then the NGVD 29/NAVD 88 elevation of the reference low water or pool reference plane should be clearly indicated on the drawings and data files.

(5) Shoreline/Bankline Depiction. In order for ECS systems to display shoreline or bank line limits at varying river stages, topographic data of adjacent revetments and flood control structures should be incorporated as a separate layer/level in the database. Topographic elevation data may be obtained from any available source; such as overbank surveys, revetment as-built surveys, or HEC model cross sections, although accuracy of the data must be consistent.

g. Feature content and electronic data file standards. The CADD/GIS (Tri-Service) Technology Center at WES has developed a series of standards for CADD and GIS applications. These include: (1) Architectural, Engineering, and Construction (A/E/C) CADD Standards (A/E/C CADD Standards, and (2) Spatial Data Standards (SDS, known formerly as the Tri-Service standards). The SDS includes a delineation of graphic elements and non-graphic attribute tables and domain lists describing these elements which are indexed into a schema or data dictionary. It also includes graphic symbology and other display and digital characteristics. The SDS have been expanded to include hydrographic and bathymetric data sets. SDS should be used for all geospatial data used in the generation of maps, charts, CADD, GIS, or other digital data provided to the public, and direct correlation between SDS and S-57 will be determined in the Master Plan.

(1) National Hydrography Data Content Standard for Coastal and Inland Waterways (FGDC). A "National Hydrography Data Content Standard for Coastal and Inland Waterways" was designed by the FGDC Bathymetric Subcommittee to develop a nationally focused hydrographic data content standard for spatial data that supports safety to navigation. An excerpt of the latest draft is at Appendix C. This feature content standard was designed to facilitate semantic consistency when capturing hydrographic information in a spatial database and provide consistent data for ECS type applications that query, analyze, and/or display spatial data. All planimetric, topographic, and related navigation features shown on USACE electronic or hard-copy drawings or charts should follow this standard. This standard provides a consistent catalog of terms and definitions (semantics) to ensure uniform interpretation of information across a variety of maritime organizations that develop and use hydrographic feature data and applications. Features in this standard were taken from (Tri-Service) Spatial Data Standards (SDS), USACE Regional Engineering and Environmental GIS (REEGIS) data dictionary, IHO S-57, and from standards used by various inland and coastal districts. It is based on a well known logical data model for geospatial data of features, attributes, and domain values that is consistent with the FGDC Spatial Data Transfer Standard/Federal Information Processing Standard (SDTS/FIPS 173 part 2).

(2) Chart symbolization standards. NOAA has developed a feature symbology library that should be used as the Corps-wide standard for all navigation data products. This library is based directly on International Hydrographic Office S-52 Standard for hydrographic data presentation. Use of this symbology library ensures full compatibility between coastal NOAA charts and USACE inland charts. The symbology library is incorporated in the (Tri-Service) A/E/C CADD Standards.

(3) Electronic data file type and format standards. The vast majority of USACE districts currently utilize CADD technology for the preparation, distribution, storage, and maintenance of engineering and architectural drawings, including navigation project data and related maps. Standardized file structures for these CADD platforms should be followed to simplify conversion to S-57, which will be required in the Master Plan. These file structures include defined drawing file origins, units, naming conventions, sheet layout, level/layer assignments, symbology, exchange formats, etc. These standards are defined in the (Tri-Service) A/E/C CADD Standards. In general, the following file types are suitable for USACE hydrographic data for current dissemination to the navigation industry and eventual conversion to S-57.

(a) CADD Platforms:

Vector—use DGN, DXF, or DWG only
Vector with Attribute—use DXF with attributes

(b) GIS Platforms (Vectors and Polygons with Attached Database):

Use ESRI Shape files, Intergraph MGE, or AutoDesk MAP only. Provide feature level metadata and use (Tri-Service) CADD/GIS Center TSSDS Entity (Feature) Sets.

(4) GIS-based technology. Districts should strive to adapt software that will allow posting of vector files containing full feature attributes—i.e., GIS-based software as opposed to traditional CADD-based. Use of GIS provides spatial relationships between all geographic features (entities); allowing for more enhanced data query, analysis, retrieval, and display than traditional CADD systems. Such files are more useful to EC vendors and are more suitable for conversion to S-57. Pending transition to use of GIS-based software, the above general standards should be followed.

h. Internet Web posting standards of engineering drawings.

(1) Standards for posting navigation data to web and clearinghouse. Districts should use uniform and standardized procedures for posting vector files and raster images of condition survey drawings on Web sites. Using these procedures, periodic condition survey drawings are automatically uploaded to the Web server; typically within one day of receipt of field survey data. This rapid data processing and posting process provides near-real-time receipt of channel condition data by project users, for potential immediate use for electronic chart applications once HQUSACE has developed standardized uploading procedures and distributed server system for public access. Currently, districts should post available data on their own sites for open availability.

(2) *Posting raster imagery data to Web sites.* In addition to digital data files of CADD/GIS engineering drawings of mapping and hydrographic survey data, raster type files of condition survey drawings may be posted on the Internet server. These raster images can be in a format that is Web browser compatible—i.e., without need for plug-ins. These formats may include PDF, CGM, JPEG, TIFF, CALS, HMR, and IPLOT. .

(3) Metadata standards for navigation data. A metadata file describing the geographic data file(s) content and format should be generated and placed on the Internet. The metadata file can be placed on the USACE NSDI Clearinghouse Node server along with the appropriate links to the geographic data file(s)--refer to Chapter 6 for details on Clearinghouse procedures. Tools and instructions for creating the

metadata files are available on the USACE NSDI Clearinghouse Node. Metadata files should be generated following guidance in EM 1110-1-2909 (Geospatial Data and Systems).

(4) Liability considerations. No additional liability is associated with providing digital data as compared to its equivalent hard copy form, if due diligence is used to inform users of data characteristics, such as accuracy, date of collection, period of validity, units of measure, datums, and other information important to navigation users. Proper and complete metadata files, posted with the data, satisfy this obligation. Users of digital data, like hard-copy data, are responsible for their technical misuse of the data, such as enlarging it beyond the scale/accuracy limits specified in the metadata file. Digital and hard copy files should not include disclaimers cautioning against inappropriate use of data—e.g., “Do Not Use for Navigation.” Data accuracies and other related information should be posted within metadata files. When the S-57 standard is implemented, metadata will be included within the file structure.

(5) User access fees. No charge should be made for geospatial data downloaded from the Internet.

(6) Distribution of digital data to other federal agencies, project sponsors, port authorities, pilots, and other private entities. Other federal agencies and public and private users will be encouraged (and in the future expected) to access the Internet for USACE data and information. Districts should honor specific requests for hard copy paper drawings from agencies, sponsors, or individuals that cannot yet access the Internet or cannot print out large-format channel condition survey drawings.

(7) Third party chart vendors. Private vendors are encouraged to use USACE developed geospatial data in preparation of electronic charts or use in electronic chart systems (ECS) that integrate USACE data with satellite or other positioning systems to improve navigation safety on inland, Great Lakes, and coastal projects.

i. Standards for publishing hard copy river chart books and channel condition survey drawings.

(1) *Standards for publishing hard copy river chart books.* The following standards supplement portions of EP 1130-2-520 and apply to USACE charts of inland navigation systems.

(a) Units: Use common English units only—no metric.

(b) Scale Ratios: Use only standard, common engineering ratios (e.g., 1 in = 400 ft, 800 ft, 1,000 ft, 1,200 ft, 1,600 ft, 2,000 ft, 2,400 ft).

(c) Use standard scale along entire waterway if feasible and practical. Optimize scale to paper size and waterway width following above scale ratio restrictions.

(2) Hard copy river book publishing format standards. The following standards for small-scale hard-copy charts and river chart books supplement portions of ER 1130-2-520 and EP 1130-2-520 and apply to USACE charts of inland navigation systems.

(a) Derive small-scale products directly from high-resolution electronic chart base files.

(b) Use same feature content and symbology standards prescribed above for digital electronic chart products.

(c) Conform to a standard page size -- 8.5" x 14". This standardized format allows for eventual user “print-on-demand”.

(d) Primary user will be recreational. In time, will phase out published river books, given expanding user capability to print-on-demand page updates.

(3) Coastal project channel condition survey standards. Periodic project condition surveys represent a major source of digital data generated by the Corps. These surveys may also include post dredge (as-built) surveys, levee revetment surveys, and airborne LIDAR surveys. The most recent hydrographic surveys of USACE projects should be placed on the Internet for public use as soon as practical after the survey is completed. Outdated surveys being superseded should be taken off the server to eliminate confusion.

19-6. Project and Channel Condition Reports

A variety of formats are used to provide project condition reports to local marine interests and other federal agencies. Plan and profile drawing formats are commonly used. Eventually, condition reports in CADD and GIS formats will be converted to S-57 format and disseminated through the USACE electronic chart data distribution system. Until the Master Plan is implemented, districts should continue posting reports in familiar formats. A typical tabular report used by Wilmington District is shown in Figure 19-3 and one from Savannah District is shown in Figure 19-4.

REPORT OF PREVAILING CHANNEL DIMENSIONS										
WILMINGTON HARBOR, NC SHIP CHANNEL US ARMY ENGINEER DISTRICT, WILMINGTON						MINIMUM DEPTH IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD				
NAME OF CHANNEL	PROJECT		PROJECT			-----				
	MAP FILE NO. WM 105-	DATE SURVEY	FEET WIDTH	MILES LENGTH	FEET DEPTH	LEFT OUTSIDE QTR-FT	LEFT INSIDE QTR-FT	MID- CHANNEL	RIGHT INSIDE QTR-FT	RIGHT OUTSIDE QTR-FT
BALDHEAD SHOAL	89-20	03-89	500	4.54	40	33.5	35.5	37.0	37.0	32.5
SMITH ISLAND	89-18	03-89	500	0.98	40	24.0	36.5	42.0	41.5	39.5
BALDHEAD CASWELL CHANNEL	89-5	01-89	500	0.38	40	39.5	40.0	40.0	41.5	38.5
SOUTHPORT CHANNEL	89-6	01-89	500	1.02	40	42.5	43.5	41.5	42.0	37.5
BATTERY ISLAND CHANNEL	89-24	04-89	500	0.49	40	43.0	44.0	44.0	39.0	33.5
LOWER SWASH	89-19	03-89	400	1.60	38	33.5	40.0	40.0	40.5	34.0
SNOW MARSH	89-23	04-89	400	3.06	38	36.0	37.5	38.5	38.0	34.5
HORSESHOE SHOAL	89-25	04-89	400	1.22	38	31.5	38.0	38.0	38.0	38.0
REAVES POINT	89-26	04-89	400	1.17	38	35.0	38.0	38.5	38.0	37.0
LOWER MIDNIGHT	89-28	03-89	400	1.64	38	34.5	37.5	37.5	38.0	35.0
UPPER MIDNIGHT	89-22	03-89	400	2.69	38	37.0	38.0	38.0	38.0	35.5
LOWER LILLIPUT	89-29	04-89	400	1.94	38	36.5	37.0	37.0	36.5	36.0
UPPER LILLIPUT	89-31	04-89	400	1.94	38	36.0	36.5	38.0	36.5	37.0
KEG ISLAND	89-32	04-89	400	1.35	38	37.0	38.5	38.5	37.5	33.0
LOWER BIG ISLAND	89-35	04-89	400	0.76	38	36.0	38.5	38.0	37.0	29.0
UPPER BIG ISLAND	89-35	04-89	400	0.50	38	36.0	39.0	40.5	40.0	31.0
LOWER BRUNSWICK	89-34	04-89	400	1.64	38	19.5	39.0	39.5	38.5	35.0
UPPER BRUNSWICK	89-33	04-89	400	1.00	38	21.0	39.5	39.0	39.5	32.5
FOURTH EAST JETTY	89-30	04-89	400	1.24	38	36.0	40.0	39.5	40.0	38.5
BETWEEN CHANNEL	89-16	03-89	550	0.80	38	33.5	40.5	40.5	39.5	38.5
ANCHORAGE BASIN & APP CHANNEL	89-15	03-89	450- 1090	1.30	38	36.0	38.0	38.5	37.0	35.5
BATTLESHIP TO HWY 74-76 BRG 32	88-18	02-88	300	0.62	32	26.5	35.5	36.5	36.0	34.5
HWY 133 TO BTLSP & TB 32'	89-1	01-88	890	0.00	32	27.0	28.0	31.5	30.5	25.0
HILTON BRG (ACL RR) TO HWY 133	88-20	03-88	300	0.00	32	30.0	31.5	32.5	33.0	29.0
NORTHEAST (CFR) ABV HILTON BRG	89-12	02-89	200	1.23	25	21.0	24.0	18.5	18.0	13.5

NOTE: DEPTHS ARE EXPRESSED TO THE NEAREST HALF-FOOT AND REFER TO LOCAL MEAN-LOW-WATER.
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Figure 19-3. Tabular channel condition report for Wilmington Ship Canal (Wilmington District)

REPORT OF CHANNEL CONDITIONS 100 TO 400 FEET WIDE (ER 1130-2-316)						Page 1 of 1		
						June 2000		
TO: Port Director, Canaveral Port Authority P.O. Box 267, Cape Canaveral, FL				FROM: USACE, District Engineer Attn: CESAJ-CO-OM Jacksonville, Florida				
RIVER/HARBOR NAME AND STATE Canaveral Harbor, Brevard County, FL				MINIMUM DEPTHS IN EACH 1/4 WIDTH OF CHANNEL ENTERING FROM SEAWARD				
NAME OF CHANNEL	Date of Survey	AUTHORIZED PROJECT			Left Outside Quarter (feet)	Left Inside Quarter (feet)	Right Inside Quarter (feet)	Right Outside Quarter (feet)
		Width (feet)	Length (miles)	Depth (feet)				
Outer Reach Entrance Channel: Cuts 1A & 1B, from entrance to 500 feet landward of red lighted Buoy-6	Apr-2000	400	3.1	44	43.6 (1)	43.7 (1)	43.2 (1)	43.6 (1)
Entrance Channel: Cut-1, from 500 feet landward of red lighted Buoy-6 to red lighted Buoy- 10	Apr-2000	400	2.4	44	41.9 (2)	41.9 (2)	42.0 (2)	42.4 (2)
Widener: Cuts 1 & 2	Apr-2000	400	0.9	44/41	40.1 (3)	43.6 (4)	43.1 (4)	42.6 (4)
Middle Reach Entrance Channel: Cut-2, from red lighted Buoy-10 to the west side of the Trident Entrance Channel	Apr-2000	400	1.1	44	44.4	44.7	44.9	44.1

1. Minor spot shoaling halfway into Cut-1A.
2. Shoaling throughout channel from 700 feet landward of red lighted Buoy-8 to red lighted Buoy-10.
3. Minor shoaling in 41-foot project, 100 feet seaward of green lighted Buoy-13.
4. Minor shoaling throughout seaward half of widener.
5. Minor shoaling along north and south edges of channel.
6. Spot shoaling throughout 39-foot project.
7. Shoaling along east and north edges of turning basin (35-foot project).
8. Extreme shoaling along eastern edge of access channel in vicinity of red Light-2. Least depths occur approximately 250 feet north of Light-2.
9. Shoaling along northeast edge of turning basin.

ENG FORM 4021-R, NOV 90	EDITION OF JUL 59 IS OBSOLETE	(Proponent:CECW-OW)
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Figure 19-4. Tabular channel condition report for Canaveral Harbor, FL (Jacksonville District)

Tabular channel condition reports can also be placed on a web site, as illustrated in Figure 19-5.

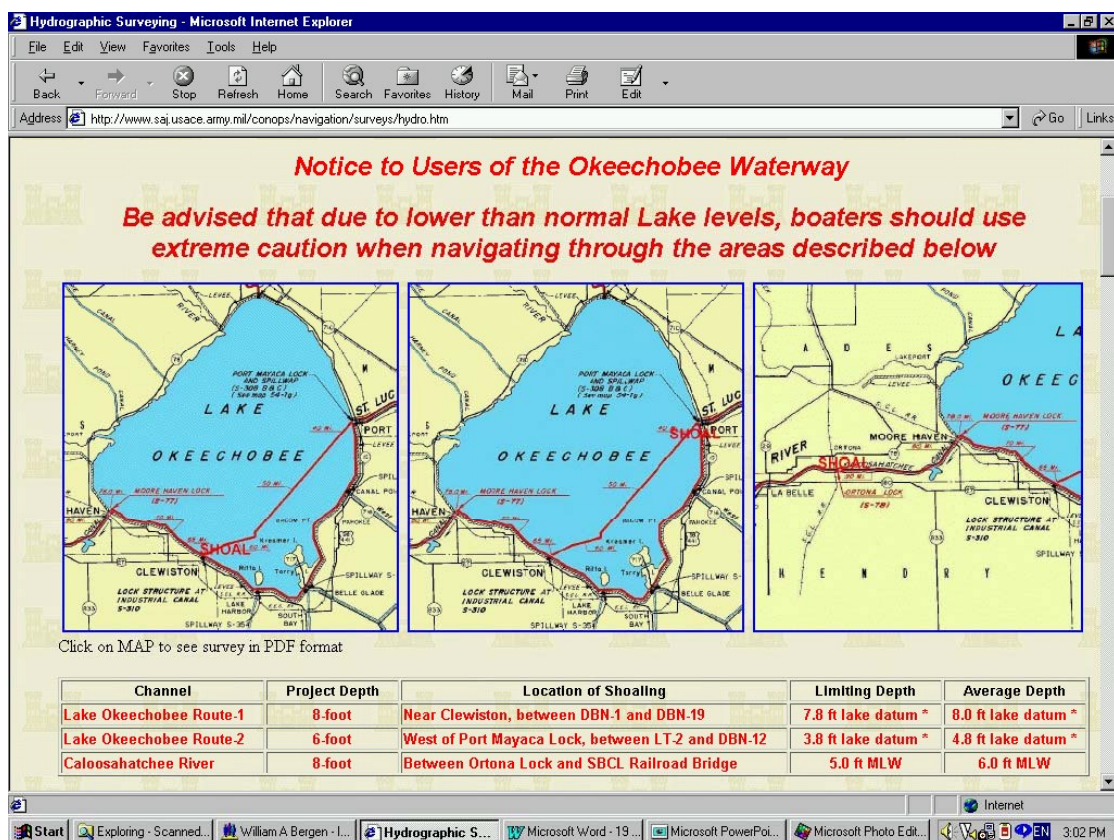


Figure 19-5. Internet channel condition report listing shoal areas on Lake Okeechobee Waterway (Jacksonville District)

Plan drawings of channel conditions shall be furnished to other agencies in accordance with the provisions of ER 1130-2-520 and EP 1130-2-520. Significant requirements in this regulation include coordination and cooperation with the USCG on NAVAID location or relocation during design and construction; USACE-maintained NAVAIDS; requirements to furnish channel condition reports to the National Imagery and Mapping Agency (NIMA), the US Naval Oceanographic Office (NAVOCEANO), NOAA, and the USCG; required tabular formats for reporting controlling depths; required grid systems; and required plotting and tabulation of NAVAIDS located during the course of a survey.

- a. Grids and/or coordinate listings should clearly show their origin (NAD 27 or NAD 83), along with the applicable state zone and the relationship between the NAD 27 and NAD 83 datums.
- b. In US coastal waters, MLLW datum shall be used exclusively. When a project vertical datum other than MLLW is used, condition drawings will contain a vertical datum diagram showing the relationship between the particular local datum used and the MLLW (if tidal) and/or NGVD 29 (if not tidal) datum. However, in the Great Lakes, all project datums shall be referred to IGLD (i.e., IGLD 85).
- c. The USCG should be furnished project horizontal control data sheets for use in positioning NAVAIDS and monitoring waterways.

d. Representations of submarine cables and pipelines on condition reports or charts will follow the provisions of NOAA Chart No. 1 for symbols and abbreviations where applicable.

e. Charted or tabulated reference elevations, datums, obstruction clearances, and structural clearances in tidal areas shall follow the NOAA conventions.

19-7. Electronic River Charts and Related Navigation/GIS Data

Some districts have begun to furnish navigation data to pilots and the public on CD-ROM format. In the Master Plan, such data products in CADD, GIS, raster and other formats will be superseded by S-57 data. However, the new ENC products will be derived from the current data. If possible, districts should produce and publish river charts on CDs until the Master Plan is implemented. The following CD-ROM data set is typical of that furnished to the public for navigation projects maintained by the New Orleans District. The Atchafalaya River Navigation Folio duplicates the hard-copy chart books sold to the public--see sample chart at Figure 19-6. Actual hydrographic elevations and soundings are contained in the Hydrographic Survey Book--in both PDF and DGN formats (Figure 19-7). An Intergraph MGE format is also provided for Mississippi Valley Division REEGIS compatible data. The following listing is excerpted from the Atchafalaya River CD-ROM:

1999 ATCHAFALAYA RIVER CHART BOOKS AND GIS CD-ROM DATA CONTENTS:

1999 Atchafalaya River Hydrographic Survey Book
(Adobe PDF and MicroStation DGN formats)

1999 Atchafalaya River Navigation Folio
(Adobe PDF format)

Atchafalaya Basin REEGIS-Format GIS
(Intergraph MGE format)

GIS Project Export
(Intergraph MGE format)

This CD is a product of the New Orleans District US Army Corps of Engineers.

It contains spatial information on navigation and hydrographic features within the Atchafalaya River Basin. It encompasses the geographic area south of the Red River, LA below latitude 31°N and the Old River Inflow Channel to Atchafalaya Bay, south of Eugene Island.

These products were developed under contract DACW29-97-C-0020 during 1998 and 1999.

This work was performed by:

3001, Inc.
5525 Mounes Street, Suite 102
New Orleans, LA 70132
Voice: (504) 733-3001.

For Additional Information:

US Army Corps of Engineers, New Orleans District
Attn: Map Sales/CEMVN-ED-SD
P.O. Box 60267

New Orleans, LA 70160-0267
Voice: (504) 862-1823
Fax: (504) 862-1585,
Email: Nathaniel.Griffin.Jr@mvn02.usace.army.mil

For Technical Assistance, contact:
US Army Corps of Engineers, New Orleans District
Chief/Drafting Section
Voice: (504) 862-2716
<http://www.mvn.usace.army.mil/>

DIRECTORY CONTENTS:

=====

. \ATCH-HYD	Atchafalaya River Hydrographic Book files
. \ATCH-HYD \DGN	MicroStation design files
. \ATCH-HYD \DGN \H31-001 thru H31-137	Hydrographic cartographic design files, sheets 1 thru 137
. \ATCH-HYD \DGN \H31-DX1 and H31-DX2	Hydrographic index sheets 1 and 2
. \ATCH-HYD \MAPPUB	files needed to reproduce map sheets as published
. \ATCH-HYD \MAPPUB \IFT	iplot feature tables for Hydrographic product
. \ATCH-HYD \MAPPUB \IFT \HYD	feature tables for map sheets 1 thru 137
. \ATCH-HYD \MAPPUB \IFT \HYD-IDX	feature tables for index sheets 1 and 2
. \ATCH-HYD \MAPPUB \LIB	resource files used by MicroStation and MapPublisher
. \ATCH-HYD \MAPPUB \PERL	Perl scripts used to generate final MapPublisher output
. \ATCH-HYD \PDF	Hydrographic Book sheets in Adobe Acrobat format; 'Indx001' and 'Indx002' contain hyperlinks to map sheets
. \ATCH-NAV	Atchafalaya Navigation Book files
. \ATCH-NAV \PDF	Navigation Book sheets in Adobe Acrobat format; 'Indx_01' and 'Indx_02' contain hyperlinks to map sheets
. \METADATA	Metadata for products included on CD
. \REGIS _DGN	MGE-compatible design files representing GIS data set
. \REGIS _MPD	MGE format database dump
. \REGIS _ORACLE	ORACLE format database dump
. \REGIS _RIS	RIS format database dump

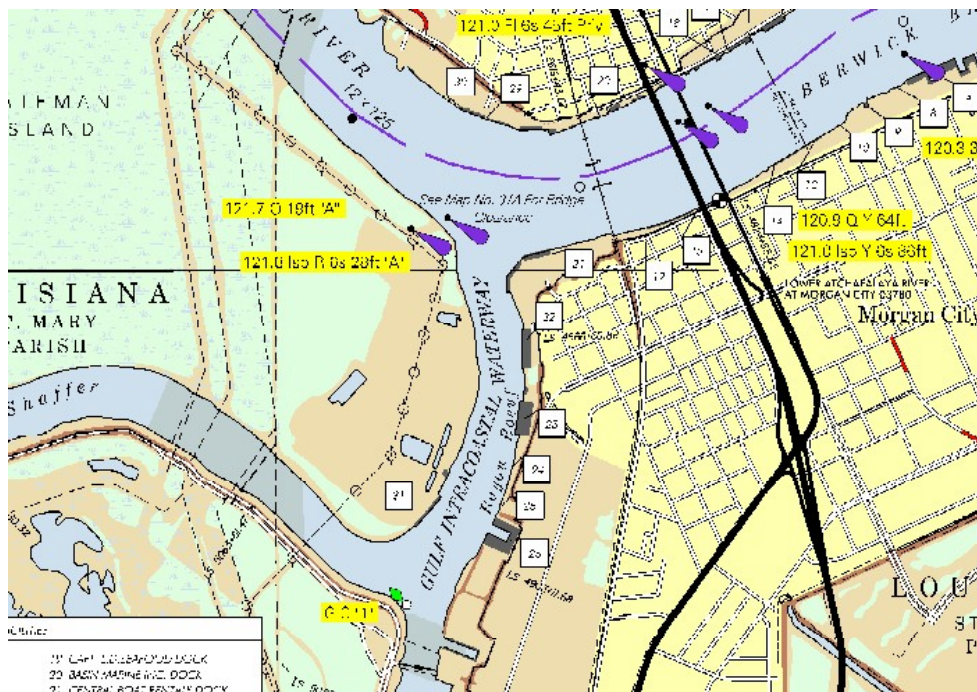


Figure 19-6. Portion of Atchafalaya River navigation chart on CD-ROM--Morgan City, LA area

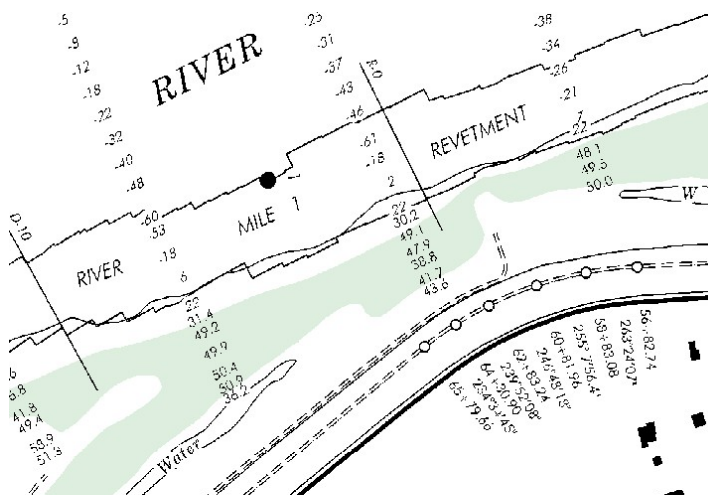


Figure 19-7. Portion of Atchafalaya River Hydro Book on CD-ROM--Atchafalaya River Mile 1 Revetment area

19-8. Web Posting of Navigation Charts and Surveys

As ENC and related S-57 data is produced under the Master Plan the S-57 files will be posted on the Internet for open public access. A uniform data server and file structure will be implemented across the districts, and access will be possible through each district web site. A central web site will also be established that will access each district server, enabling single access by all outside users to all electronic chart files. Currently, districts should maintain their own web sites and posted data files for download. The following web sites in Table 19-1 have been set up by Corps districts to distribute their navigation data. Coastal districts listed will generally provide data from the most current project condition survey--usually in a native format--e.g., DGN. Currently, not all sites provide digital copies of inland navigation river charts.

Table 19-1. Corps Navigation Data Web Sites (2000)

District	Navigation Chart Web Address	Division Code	District Code
Buffalo District	http://lrb.usace.army.mil/outreach/survey.html	LRD	LRB
Detroit District	http://huron.lre.usace.army.mil/OandM/o&m.html	LRD	LRE
Huntington District	http://cae.lrh.usace.army.mil/pub/ecda/river_charts/	LRD	LRH
Louisville District	http://www.lrl.usace.army.mil/or/text/chartinx.htm	LRD	LRL
Nashville District	http://www.orn.usace.army.mil/lakeinfo/NavCharts/TNRiver/tntext.html	LRD	LRN
Nashville District	http://www.orn.usace.army.mil/lakeinfo/NavCharts/CumbRiver/default.html	LRD	LRN
Pittsburgh District	http://www.lrp.usace.army.mil/nav/nav.htm	LRD	LRP
Vicksburg District	http://www.mvk.usace.army.mil/maps.htm	MVD	MVK
New Orleans District	http://www.mvn.usace.army.mil/eng/eng_data.htm	MVD	MVN
Memphis District	http://www.mvd.usace.army.mil/reegis/navbook/main2.htm	MVD	MVM
St. Paul District	http://www.mvp.usace.army.mil/pp/umrp/nav/ld.html	MVD	MVP
Rock Island District	http://www.mvr.usace.army.mil/navdata/nic.htm#Visual	MVD	MVR
St .Louis District	http://www.mvr.usace.army.mil/navdata/nic.htm#Visual	MVD	MVS
Baltimore District	http://www.nab.usace.army.mil/	NAD	NAB
New England District	http://www.nae.usace.army.mil/waterres/water.htm	NAD	NAE
New York District	http://www.nan.usace.army.mil/business/buslinks/navig/index.htm	NAD	NAN
Norfolk District	http://155.78.30.111/	NAD	NAO
Philadelphia District	http://www.nap.usace.army.mil/channel/list.htm	NAD	NAP
Kansas City District	http://www.nwk.usace.army.mil/mrknewmap.html	NWD	NWK
Omaha District	http://www.nwo.usace.army.mil/html/Lake_Proj/maps.htm	NWD	NWO
Portland District	http://www.nwp.usace.army.mil/info.htm	NWD	NWP
Seattle District	http://crunch.tec.army.mil/	NWD	NWS
Walla Walla District	http://www.nww.usace.army.mil/html/offices/pl/h/wm/wmpage.htm	NWD	NWW
Charleston District	http://www.sac.usace.army.mil/	SAD	SAC
Jacksonville District	http://www.saj.usace.army.mil/nav/index.html	SAD	SAJ
Mobile District	http://www.sam.usace.army.mil/op/nav/	SAD	SAM
Savannah District	http://144.3.144.48/lakes.htm	SAD	SAS
Wilmington District	http://www.saw.usace.army.mil/nav.htm	SAD	SAW
San Francisco District	http://www.spn.usace.army.mil/	SPD	SPN
Little Rock District	http://www.swl.usace.army.mil/pao/charts.html	SWD	SWL
Tulsa District	http://www.swt.usace.army.mil/navigation/navcharts.htm	SWD	SWT

New Orleans District provides inland navigation data to the public in a variety of formats and download options as illustrated in Figures 19-8, 19-9, and 19-10 below.



[Engineering Data Page]



**Mississippi River
1998 Navigation Charts**

**US Army Corps
of Engineers®**
New Orleans District

In October, the Mississippi River 1998 Navigation Charts were printed. This WWW page is a "wrapper" around the full map site hosted at Mississippi Valley Division (MVD). The New Orleans specific digital maps may be reviewed via links provided below or by going to the (MVD) site.

NOTE: You will need the [Adobe Acrobat Reader](#) to view the Chart files.

- [INSTRUCTIONS](#) -- How to use Acrobat Reader and download charts.
- [LEGEND](#) -- Review the symbology used on the charts.
- [NEW ORLEANS DISTRICT CHARTS](#) -- Review charts BELOW Old River Lock (Mile 290 to the Gulf)
- [ABOVE NEW ORLEANS DISTRICT](#) -- Review charts ABOVE Old River Lock (Cairo, IL to Mile 290 AHP)
- [PURCHASE CHARTS](#) -- Charts may be purchased in full-color hard copy or on CD-ROM.

River Navigation Conditions

New Orleans District Operations Division performs routine hydrographic surveys to determine waterway and river navigation conditions. These surveys are processed into CADD drawing files for review and analysis. We use Bentley/Intergraph [MicroStation Design File \(DGN\)](#) file formats for this data processing. These survey files may be reviewed via your browser or downloaded for your use.

The river navigation conditions and surveys are



**US Army Corps
of Engineers®**
New Orleans District

[Return to \[Maps & Data\]](#)


1999 Atchafalaya Basin Mapping Project

The Atchafalaya River is the largest of all distributaries of the Mississippi River, with a basin covering more than one million acres. The New Orleans District Corps of Engineers completed the 1999 Atchafalaya Basin Mapping Project, which has resulted in the creation of an overall Atchafalaya Basin GIS as well as four cartographic products totaling nearly 750 map sheets. The GIS has been developed utilizing the Regional Engineering and Environmental Geospatial Information System (REEGIS). The REGIS schema was developed by the Corps of Engineers Mississippi Valley Division, and was implemented for the Atchafalaya Basin using Intergraph's MGE software and an Oracle database. The GIS encompasses such categories as general river features, hydrography, navigation aids and facilities, structures, transportation, and other data features.

Atchafalaya River Hydrographic Survey Book

The Atchafalaya River Hydrographic Survey Book consists of 137 map sheets mapped to 1:10,000 publication scale. Each map sheet is available for download in Adobe PDF format (in the same plot scale as the paper maps) and MicroStation DGN format.

Figure 19-8. Sample navigation data web site--New Orleans District



CADD/GIS/FM Registry and Clearinghouse - Visit a Corps-wide clearinghouse created to share project information, lessons learned, and new technology in GIS, CADD, and Facilities Management(FM).

Civil Works Digital Project Notebook - an interactive map presenting information on all Corps Civil Works projects.

1999 Atchafalaya River Basin Mapping Products including a new [Hydrographic Survey Book](#), revised, full-color [Navigation Charts](#), an [Interactive Atchafalaya Map](#) supporting queries, and associated [GIS Data Set](#).

1998-1999 Atchafalaya River Hydrographic Survey Book

1999 Atchafalaya River Navigation Charts

1998 Mississippi River Navigation Charts

Index to all Corps Navigation Charts
--listed by Corps District

[\[Engineering Division Home\]](#)

MAPS & DATA

New Orleans District Digital Map, GIS, CADD Data

LINKS to Related GIS, Maps, & Data Sites.

Maps for Sale - Products for sale & order form.

Navigation Project Condition Maps - Maps of channel conditions are available for numerous navigation project areas.

1991-1992 Mississippi River Hydrographic Survey - Survey of the Mississippi River from the Gulf of Mexico to Black Hawk, LA (Mile 324.0 AHP).

Mississippi River Historic Comprehensive Surveys - Surveys from the 1880s, 1913/1915, 1930s, 1948, 1962, 1975, 1983, and 1992.

Aerial Photos of Louisiana -- listing of our's extensive aerial photography collection of contact prints and film negatives dating back to the 1920s.

Project Maps of the New Orleans District - listing of downloadable map images and project descriptions from the New Orleans District Project Map Book.

Figure 19-9. Listing of digital maps, charts, GIS, and CADD products available from the New Orleans District

MISSISSIPPI RIVER -- SOUTHWEST & SOUTH PASS SURVEY DATA AND CHARTS



Mississippi River -- Southwest & South Pass
Hydrographic Survey Sheet Limits

Click map sheet to preview the current surveys in multiple formats!! [SVF](#) or [CGM](#) formats require the [proper plugins](#). Latest [browser versions](#) allow viewing via a provided JAVA Applet.

Graphic Format:

JPEG

JPEG

JAVA Viewer

CGM (plugin req'd.)

SVF (plugin req'd.)

[Internet Explorer](#) is recommended for the Mississippi River Southwest Pass surveying procedure, survey schedule, chart limits, and WWW page update process.

All files listed below use large reference files of 1.4 MB to 2.5 MB to create complete plates with associated topography. If these files are required, they may be [downloaded](#) or [purchased](#) on electronic media.

Download PKZIPed surveys with [SAVE LINK AS...] command:			
SHEET NAME & LIMITS	CURRENT SURVEY	LAST 2 SURVEYS	
Sheet 1B - Mile 13.5 AHP to 10.5 AHP (Approx. 100 kb)	28-SEP-2000	16-FEB-2000	15-DEC-1999
Sheet 1A - Mile 10.5 AHP to 7.7 AHP (All approx. 100 kb)	28-SEP-2000	07-JUL-2000	16-FEB-2000
Sheet 1 - Mile 7.7 AHP to 4.5 AHP (Approx. 100 kb)	28-SEP-2000	07-JUN-2000	24-MAR-2000

Figure 19-10. Mississippi River South Pass and Southwest Pass. Digital data may be downloaded from the New Orleans District server in any of the following formats: JPEG, JAVA, CGM, or SVF

Some coastal districts post channel condition reports and hydrographic surveys on their web servers. The native format (e.g., DGN) can be pulled down directly by other federal agencies and public users with CADD capabilities. A readable format, such as PDF, is included for the general public. An example of a typical public web site for project condition surveys is shown in Figure 19-11.

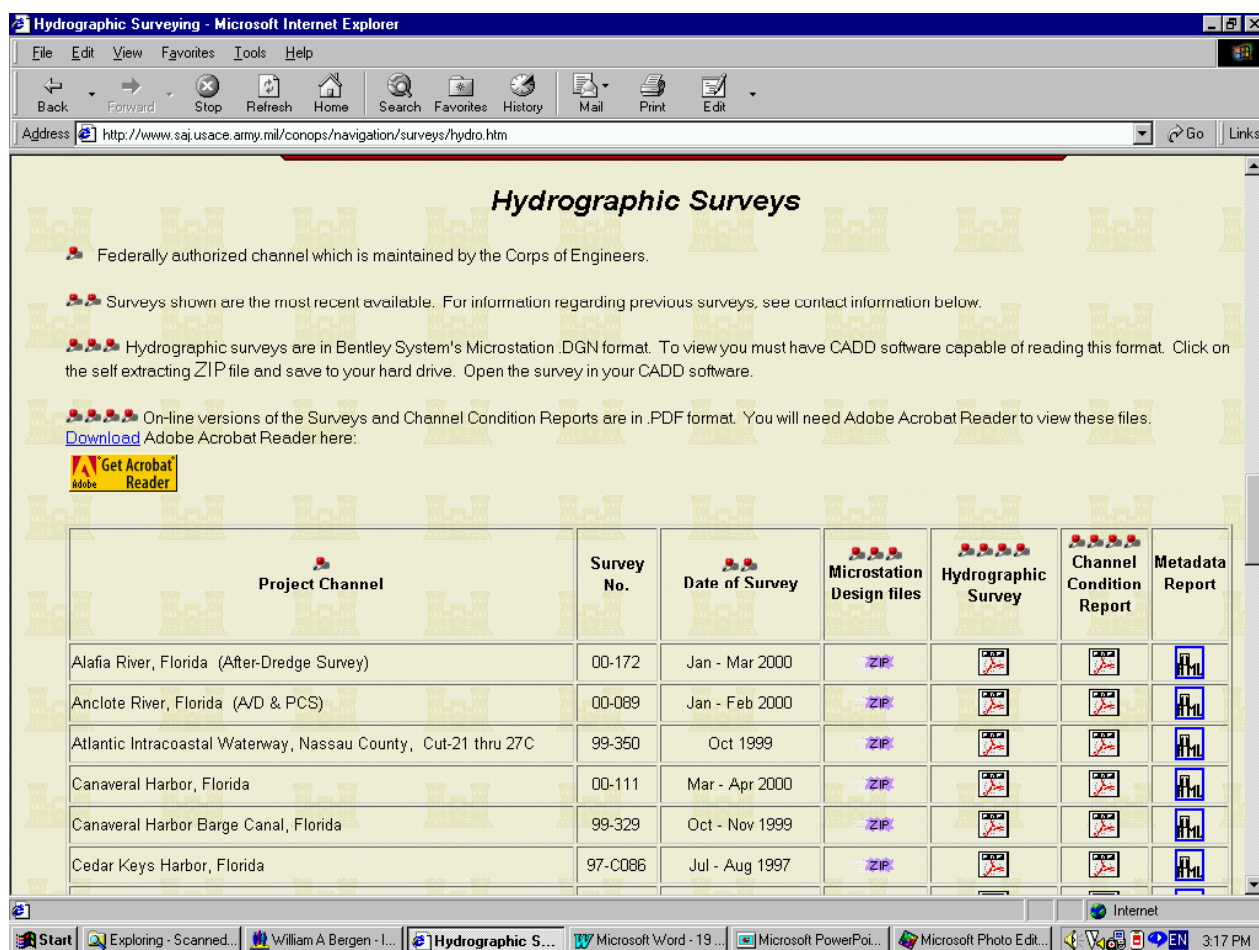


Figure 19-11. Sample web site for downloading coastal project condition surveys--Jacksonville District

Most channel condition surveys are indexed as shown in Figure 19-12. This index for the Atlantic Intracoastal Waterway outlines 89 individual full-size drawings that may be selected. Web sites can be configured to allow direct sheet selection from the index sheet. Each sheet may be pulled down in either native DGN (Zipped) or PDF format.

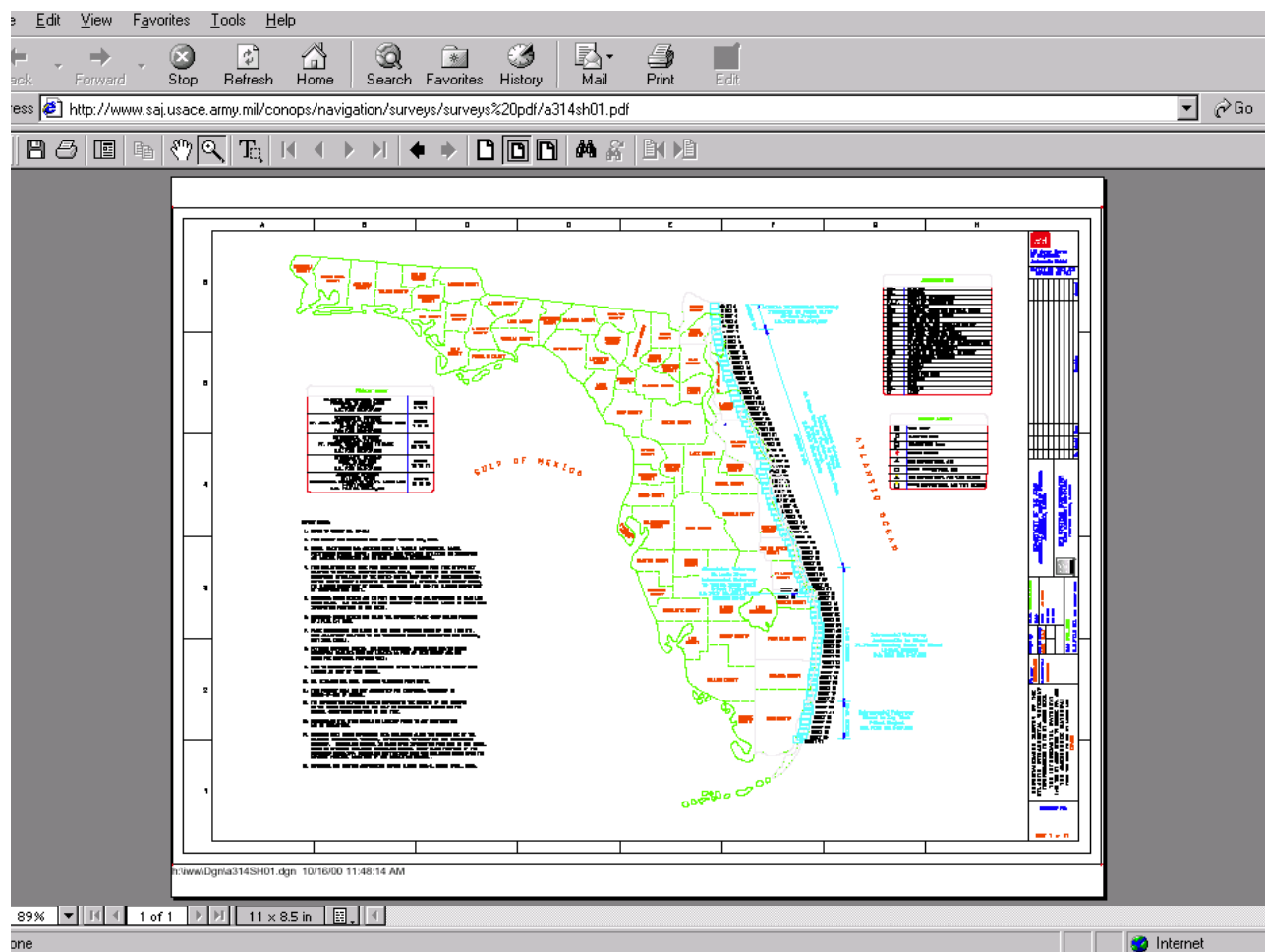


Figure 19-12. Web site index sheet for Atlantic Intracoastal Waterway (Jacksonville to Miami)
Jacksonville District

Level #	Level/Layer Naming		Level/Layer Description	Graphics			
	AIA Format	ISO Format		Line Style	Line Width (mm)	AutoCAD Line Color/#	MicroStation Line Color/#
General Information							
1	V-ANNO-DIMS	V—DIP-	Witness/extension lines, dimension terminators, dimension text	0	V	V	V
2	V-ANNO-KEYN	V—KEP-	Reference keynotes with associated leaders	0	V	V	V
5	V-ANNO-NOTE	V—NOP-	General notes and general remarks	0	0.35	Y/2	Y/4
3	V-ANNO-NPLT	V—NPP-	Construction lines, reference targets, area calculations, review comments, viewport windows	V	0.18	B/5	B/1
4	V-ANNO-PATT	V—PAP-	Miscellaneous patterning, cross-hatching, poche	0	0.18	Gr/8	Gr/9
6	V-ANNO-SYMB	V—SYP-	Miscellaneous symbols	V	0.35	M/6	M/5
7	V-ANNO-TEXT	V—TEP-	Miscellaneous text and callouts with associated leaders	0	V	V	V
NA	V-ANNO-XREF	V—XRP-	Reference files (AutoCAD users only, see Chapter 4)	NA	NA	NA	NA
Survey Lines							
8	V-SURV-DATA	V-SURVDAM-	Survey data (PI, PT, etc.) information	0	0.35	M/6	M/5
9	V-SURV-LINE	V-SURVLIM-	Survey and control lines	2	0.50	C/4	C/7
10	V-SURV-IDEN	V-SURVIDM-	Survey and control line annotation	0	0.35	M/6	M/5
Miscellaneous Structures							
11	V-MISC-IDEN	V-MISCIDM-	Bridges, piers, breakwaters, docks, floats, etc. - annotation	0	0.35	Y/2	Y/4
12	V-MISC-OTLN	V-MISCOTM-	Bridges, piers, breakwaters, docks, floats, etc. - outlines	0	0.50	C/4	C/7
Channels							
14	V-CHAN-LIMT	V-CHANLIM-	Channel limits, anchorages, turning basins, disposal areas, etc.	0	0.35	M/6	M/5
15	V-CHAN-IDEN	V-CHANIDM-	Channel limits, anchorages, turning basins, disposal areas, etc.	0	0.35	M/6	M/5
16	V-CHAN-DACL	V-CHANDAM-	De-authorized channel limits, anchorages, etc.	0	0.25	G/3	G/2
17	V-CHAN-DAID	V-CHANDIM-	De-authorized channel limits, anchorages, etc. - annotation	0	0.25	G/3	G/2
18	V-CHAN-CNTR	V-CHANCNM-	Channel centerline and survey report lines	3	0.18	B/5	B/1
19	V-CHAN-CNID	V-CHANCIM-	Channel centerline and survey report lines - annotation	0	0.18	B/5	B/1
20	V-CHAN-AIDS	V-CHANAIM-	Navigation aids and text	0	0.35	Y/2	Y/4
Topography							
39	V-TOPO-BORE	V-TOPOBOM-	Boring locations	0	0.35	M/6	M/5
40	V-TOPO-COOR	V-TOPOCOM-	Coordinate grid ticks and text	0	0.25	R/1	R/3
41	V-TOPO-MAID	V-TOPOMAM-	Major contours - annotation	0	0.35	Y/2	Y/4
42	V-TOPO-MAJR	V-TOPOMJM-	Major contours	0	0.35	Y/2	Y/4
43	V-TOPO-MIID	V-TOPOMIM-	Minor contours - annotation	0	0.25	G/3	G/2
44	V-TOPO-MINR	V-TOPOMNM-	Minor contours	0	0.25	G/3	G/2
45	V-TOPO-SHOR	V-TOPOSHM-	Shorelines, land features, and references	0	0.50	C/4	C/7
49	V-TOPO-SOUN	V-TOPOSOM-	Soundings	0	0.25	G/3	G/2
Note: V = Varies, NA = Not Applicable							

Table 19-2. Hydrographic survey and mapping plan--recommended CADD/GIS level/layer file assignments

19-9. Mandatory Requirements

Section 554 of the Water Resources Development Act of 2000 states that not later than 60 days after the Corps completes a channel dredging project, NOAA shall be provided a digital data format of the results of the survey. The only exception is for pre-dredging or pre-construction surveys. Since these surveys are only accurate for a short time, they are exempt from data dissemination requirements. There are no other mandatory requirements in this chapter--related channel condition reporting requirements are found in ER 1130-2-520. Within six years of this publication, mandatory electronic chart data format, content, dissemination, and maintenance procedures are anticipated.